II. REMARKS

Applicants gratefully acknowledge that claim 36 has been allowed, and that the Examiner has determined claims 23, 24, 27-30 and 35 contain allowable subject matter (Office Action, dated March 10, 2010, at 3, lines 1-6).

Applicants also acknowledge the Examiner's Interview conducted on March 19, 2010 between Examiner Santiago Garcia and Applicants' attorney, Wesley Ashton, wherein the Examiner confirmed that the Office Action mailed on March 10, 2010 replaces the previous Office Action mailed January 21, 2010, which has been withdrawn. Therefore, Applicants present response is directed solely to the Office Action of March 10, 2010.

By the present amendment, claim 23 has been cancelled without prejudice, claims 18, 19, 24 and 27-31 have been amended, and new claim 37 has been added. More specifically, independent claim 18 has been amended to incorporate the subject matter of previous claim 23. In fact, claim 18 corresponds to previous claim 23 rewritten in independent form. Therefore, claim 18 now has the same scope as previous claim 23.

Claims 24, 27, 28 and 30 have been amended to depend upon claim 18, which has no further limiting effect on the scope of these claims. Claims 19, 27-29 and 31, which depend either directly or indirectly upon claim 18, have been amended in accordance with the amendment to claim 18.

New independent claim 37 includes subject matter recited by previous claims 18 and 23; however, new claim 37 is broader in scope than claim 18 as presently amended because claim 37 does not include step (d) recited by claim 18.

The present amendment adds no new matter to the above-captioned application, and raises no new issues.

A. The Invention

The present invention pertains broadly to a wireless data communication method between a transmitter device having a first wide band antenna for transmitting ultra wide band coded data signals, and a receiver device having a second wide band antenna for receiving direct path and multiple path coded data signals, and to a receiver device for implementing the wireless data communication method. In accordance with a method embodiment of the present invention, a wireless data communication method is provided that includes steps and features recited by independent claim 18. In accordance with another method embodiment of the present invention, a wireless data communication method is provided that includes steps and features recited by independent claim 36. In accordance with yet another method embodiment of the present invention, a wireless data communication method is provided that includes steps and features recited by independent claim 37. Various other embodiments, in accordance with the present invention, are recited by the dependent claims.

An advantage provided by the various embodiments of the presently claimed invention is that a wireless data communication method is provided that uses ultra-wide band encoded data signals, which is able to process, in a simple manner, all encoded direct path and multiple path signals picked up by the receiver device. Another advantage provided by the various embodiments of the presently claimed invention is that a wireless data communication method is provided that uses ultra-wide band data signals for maximizing the amplitude of the data pulses in relation to the noise picked up by the receiver device.

B. The Rejections

Claims 18-22, 25, 31, 33 and 34 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Cowie et al. (U.S. Patent Application Publication No. US 2003/0095609, hereafter the "Cowie Publication") in view of Fette et al. (U.S. Patent Application Publication No. US 2004/0264403, hereafter the "Fette Publication"). Claim 26 stands rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over the Cowie Publication in view of the Fette Publication, and further in view of Batra et al. (U.S. Patent 7,397,870, hereafter the "Batra Publication"). Claim 32 stands rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over the Cowie Publication in view of the Fette Publication, and in view of Cattaneo et al. (U.S. Patent Application Publication No. US 2003/0058963, hereafter the "Cattaneo Publication"), and further in view of Takamura et al. (U.S. Patent Application Publication No. US 2003/0035465, hereafter the "Takamura Publication").

In view of the present amendment, Applicants respectfully traverse the Examiner's rejections and request reconsideration of the claims of the above-captioned application for the following reasons.

C. Applicants' Arguments

Claim 36 has been allowed. In view of the present amendment, independent claim 18 now incorporates the allowable subject matter of previous claim 23. Consequently, claim 18 is now in condition for allowance for the reasons of record. Claims 19-22 and 24-35 all depend either directly or indirectly on claim 18 and are, therefore, likewise allowable for the reasons of record.

i. The Section 103 Rejections

A prima facie case of obviousness requires a showing that the scope and content of the prior art teaches each and every element of the claimed invention, and that the prior art provides some teaching, suggestion or motivation, or other legitimate reason, for combining the references in the manner claimed. KSR International Co. v. Teleflex Inc., 127 S.Ct. 1727, 1739-41 (2007); In re Oetiker, 24 U.S.P.Q.2d 1443 (Fed. Cir. 1992). In this case, the Examiner cannot establish a prima facie case of obviousness against independent claim 37 of the above-captioned application because the combination of the Cowie Publication, the Fette Publication, the Cattaneo Publication, the Batra Patent, and the Takamura Publication fails to teach, or suggest, each and every limitation of claim 37.

ii. The Cowie Publication

The Cowie Publication discloses a "method and apparatus for receiving a plurality of time spaced signals," which pertains to a method and system for receiving time spaced signals transmitted in accordance with a time layout, wherein the time spaced signals may be pulses or bursts (See Abstract of the Cowie Publication). The time spaced signals convey at least one intelligence signal, and the time spaced signals are received at an antenna (See Abstract of the Cowie Publication). Once received, the time spaced signals may be coherently detected, wherein the coherent detection may be accomplished by correlating the received signals with a template signal (See Abstract of the Cowie Publication). According to the Cowie Publication, the detection process can also include integration of the received signals (See Abstract of the Cowie Publication). The coherently detected signals are then contributed to a plurality of intermediate signals based on an interleaving order, which may be predetermined or specified by an interleaving code, and each of the plurality of intermediate signals can then be separately integrated to produce bits of data (See Abstract of

the Cowie Publication). The Cowie Publication further discloses that the bits of data are ordered to produce the at least one intelligence signal based on a bit order, which may be predetermined or specified by a bit ordering code (See Abstract of the Cowie Publication).

The Cowie Publication discloses an ultra-wide band (UWB) method and apparatus for receiving several time spaced UWB signals, wherein the UWB signals are received by an antenna (904) of the apparatus shown in Figure 9 in order to be correlated in a correlator (910) with a replica generated via a precision time generator (914), (Cowie Publication, ¶¶ 0155] to [0157]). The apparatus of Figures 8 and 9 of the Cowie Publication are reproduced below for the Examiner's reference.

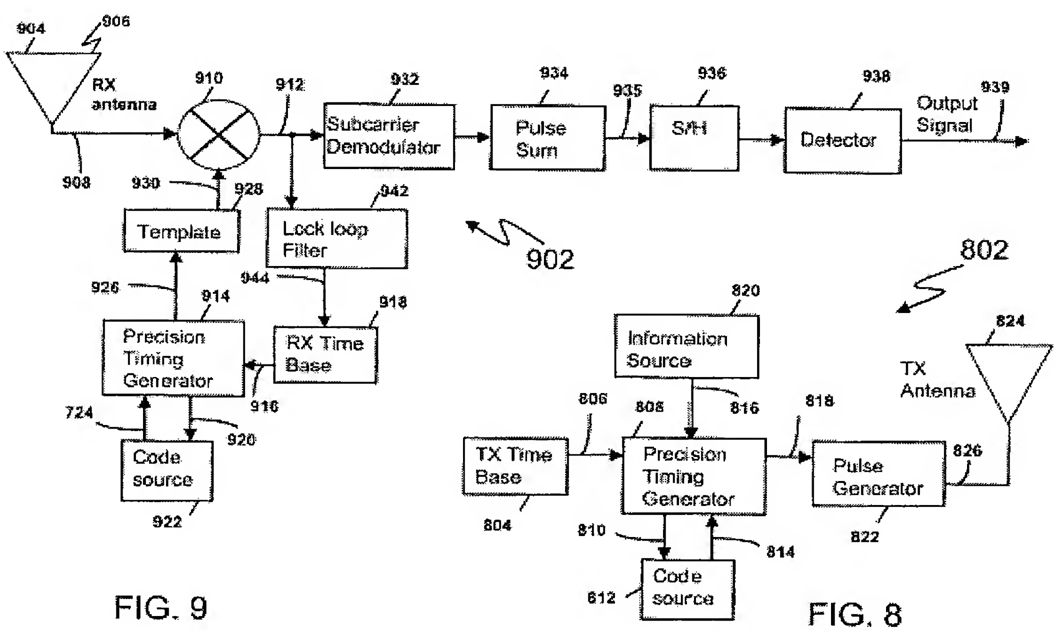


FIG. 9

FIG. 8

In order to obtain a replica like the encoding of the signals picked up by the antenna (906), the generator (914) is clocked by a clock signal (916) of a time base (918), and receives a code control signal (724) from code source (922), (Cowie Publication, ¶ [0157]). At the correlator output (912), the intermediate signals undergo temporal integration prior to demodulation and summation of the pulses in order to retrieve information from the received UWB signals (Cowie Publication, ¶ [0158]). Thus, as would be immediately appreciated by

a person of ordinary skill in the art, the Cowie Publication discloses that summation or addition of the pulses takes place **after** the demodulation operation, which is substantially different from the addition of N time windows in accordance with the present invention that takes place **before** the demodulation operation.

In addition, the correlation operation according to the Cowie Publication, ¶ [0158], is carried out before the summation of pulses. With reference to Figure 11 and ¶ [0168] of the Cowie Publication, pulses 1101(a) to 1104(a) are integrated to generate first data bit. However, this is substantially different from a coherent addition of time windows, i.e., "an operation of adding the N windows in a coherent manner," as recited by independent claim 37. Furthermore, as shown in Figure 9, the addition of pulses (934) concerns only pulses obtained after the demodulation operation is performed by the subcarrier demodulator (932). This is a drawback of Cowie's apparatus, which makes it necessary to carry out a correlation operation before the demodulation operation, which results in the fact that one cannot reduce the consumption of the apparatus.

In view of the above facts, and as admitted by the Examiner (Office Action, dated March 10, 2010, at 5, lines 4-9), the Cowie Publication does not teach, or suggest, (i)

> "carrying out, in the receiver device, an operation of adding the N windows in a coherent manner before data demodulation so that added pulse amplitude level is higher than noise amplitude level captured by the receiver device,"

as recited by independent claim 37. However, this is not the only deficiency in the disclosure of the Cowie Publication.

The Cowie Publication discloses coherent detection of picked-up UWB signals. More specifically, the Cowie Publication discloses performing a correlation of picked-up signals using at least one waited replica of determined time space pulses (See, e.g., Cowie Publication, Figures 10A, 10B, 10C, and ¶ [0161]). This correlation of picked-up signals does not correspond to an addition of time windows, which are positioned according to the

position of each pulse of a sequence of pulses as defined in claim 37. In other words, the Cowie Publication does not teach, or suggest, (ii) "each of the N reception time windows is positioned in time as a function of a known theoretical arrangement of the N pulses of the signals transmitted by the transmitter device" as recited by independent claim 37.

The Cowie Publication also does not teach, or suggest, that (iii)

> "the transmitter device includes
> i. a first oscillator stage delivering at least one first clock signal at a first defined frequency;
> ii. a first signal processing unit clocked by the clock signal provided by the first oscillator stage in order to modulate the data to be transmitted; and
> iii. a unit for shaping the N pulses of each sequence to be transmitted by the first wide band antenna of the transmitter device as a function of the data modulation provided by the first signal processing unit; and
> wherein the receiver device includes
> i. a second oscillator stage delivering at least one second clock signal at a second defined frequency;
> ii. a second signal processing unit connected to the second oscillator stage; and
> iii. an analogue-digital conversion stage for analogue signals relating to the coded data signals received by the second wide band antenna,"

as recited by claim 37.

iii. The Fette Publication

The Fette Publication discloses a "definable radio and method of operating a wireless network of same," which, as shown in Figure 1, pertains to a wireless network (100) that includes a number of definable radio systems (102) in communication with one another via a wideband backbone (108), (See Abstract of the Fette Publication). Furthermore, the Fette Publication discloses that each of the systems (102) includes a first software programmable transceiver (200) for extra-network communication using a narrowband channel defined by a radio frequency capability (106), and each of the radios (102) further includes a second transceiver for intra-network communication using wideband backbone (108), (See Abstract of the Fette Publication, and Figures 1 and 2). The Fette Publication also discloses methods

for operating the network (100) that enable the radios (102) to engage in communication over narrowband channels to carry a signal between multiple radios (102) and an extra-network location, and for communicating the signal as distinct bitstreams between the radios (102) and another of the radios (102) using the wideband backbone (108), (See Abstract of the Fette Publication). In addition, the methods disclosed by the Fette Publication allegedly enable the radios (102) to monitor multiple external networks concurrently by having each of the radios (102) use a different RF capability (106), and to combine their independently received signals to improve performance and suppress interference (See Abstract of the Fette Publication).

As would be appreciated by persons of ordinary skill in the art, the Fette Publication discloses a method for a definable radio, wherein the receiver contains several receiving nodes, wherein each one of receiving nodes receives the signal over a narrowband channel and produces a distinct bit-stream. The Fette Publication discloses several ways to either select one bit-stream or to combine several bit-streams in order to calculate a preferred bit-stream. As shown in Figure 15 of the Fette Publication, Fette discloses a selective combination of weighted bit-streams in the frequency domain to calculate the preferred bit-stream in the frequency domain. Because the preferred bit-stream is composed potentially of several bit-streams coming from narrowband channels, the preferred bit-stream can contain information as from a wideband channel.

The Fette Publication discloses that the preferred bit-stream is composed so that a quality criterion threshold (e.g., signal strength) is met or exceeded (Fette Publication, ¶ [0147]). The result is an effective phased array beam pattern toward the desired source signal with the interference removed (Fette Publication, ¶ [0147]). The preferred bit-stream is then demodulated by task (1516), (Fette Publication, ¶ [0148] and Figure 15).

The Fette Publication also discloses that the combination of weighted bit-streams can mitigate intentional or non-intentional interference (Fette Publication, ¶ [0098]). In general,

spectral capture/BSS/weighted combine sub-process (1500) enables user node (608) to distinguish source signal (604) from interference (Fette Publication, ¶ [0098], and Figure 6). Blind signal separation (BSS) is performed to distinguish source signal (604) from interference (Fette Publication, ¶ [0098]).

As shown in Figure 15 of the Fette Publication, a query task (1508), which is performed in connection with task (1506), determines whether source signal (604) is distinguishable from the interference, or jamming signal. At task (1510), the Fette Publication discloses that the interference signal is subtracted from distinct bit-streams (604), and at task (1512), which is performed in connection with task (1510), the Fette Publication discloses giving weights to bit-streams (Fette Publication, ¶ [0146], and Figure 15). Through execution of the BSS process, both source signal (604) and the interference are tracked, and a feedback weighting loop is used to null the interference while minimizing the bit error rate (BER) of the source signal (604), (Fette Publication, ¶ [0146]). The result, according to the Fette Publication, is that an effective phased array beam pattern is provided toward the desired source signal (604) with the interference removed (i.e., with the jamming signal removed), (Fette Publication, ¶ [0147]).

As would be appreciated by those of ordinary skill in the art, the Fette Publication does not teach, or suggest, a selective combination of N time windows of a signal coming from a single wideband receiver. Furthermore, the Fette Publication does not teach, or even suggest, a possible improvement of the signal-to-noise as it results from the combination of N time windows. Therefore, the Fette Publication does not teach, or even suggest, (i)

> "<u>carrying out, in the receiver device, an operation of adding the N windows in a coherent manner before data demodulation so that added pulse amplitude level is higher than noise amplitude level captured by the receiver device,</u>"

as recited by independent claim 37.

However, this is not the only deficiency in the disclosure of the Fette Publication. The Fette Publication also does not teach, or even suggest, (ii)

> "the transmitter device includes
> i. a first oscillator stage delivering at least one first clock signal at a first defined frequency;
> ii. a first signal processing unit clocked by the clock signal provided by the first oscillator stage in order to modulate the data to be transmitted; and
> iii. a unit for shaping the N pulses of each sequence to be transmitted by the first wide band antenna of the transmitter device as a function of the data modulation provided by the first signal processing unit; and
> wherein the receiver device includes
> i. a second oscillator stage delivering at least one second clock signal at a second defined frequency;
> ii. a second signal processing unit connected to the second oscillator stage; and
> iii. an analogue-digital conversion stage for analogue signals relating to the coded data signals received by the second wide band antenna,"

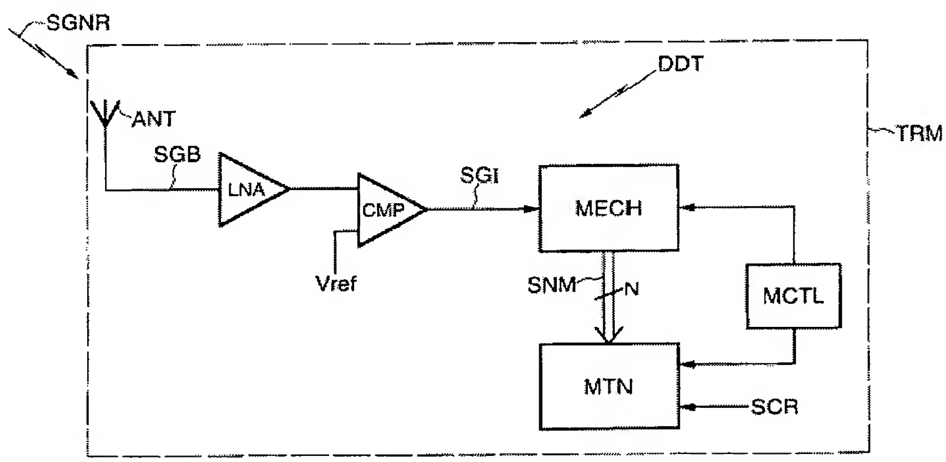
as recited by claim 37.

iv. <u>The Cattaneo Publication</u>

The Cattaneo Publication discloses a "method and device for decoding an incident pulse signal of the ultra wideband type, in particular for a wireless communication system," wherein an incident pulse signal of the ultra wideband type conveys digital information that is coded using pulses having a known theoretical shape (See Abstract of the Cattaneo Publication). According to Cattaneo, a decoding device includes an input for receiving the incident signal, and for delivering a base signal, and a comparator receives the base signal and delivers an intermediate signal representative of the sign of the base signal with respect to a reference (See Abstract of the Cattaneo Publication). A sampling circuit samples the intermediate signal for delivering a digital signal, and a digital processing circuit correlates the digital signal with a reference correlation signal corresponding to a theoretical base signal arising from the reception of a theoretical pulse having the known theoretical shape (See Abstract of the Cattaneo Publication).

Thus, the Cattaneo Publication discloses a method and device for receiving ultra-wide band type pulse signals, wherein the UWB signals include a heading frame for seeking synchronism in the reception device (Cattaneo Publication, ¶ [0020]). To do this as shown in Figure 5, reproduced below for convenience, the UWB signals (SNGR) are received by an

FIG.5



antenna (ANT) of the device in order to first be compared to a threshold voltage V_{ref} in a comparator (CMP), (Cattaneo Publication, ¶¶ [0047] to [0049]). At the output of the comparator (CMP), intermediate signals (SGI) represent the sign of the received signal in relation to a threshold voltage, and these intermediate signals (SGI), which can include different segments of a synchronization header, are then sampled by sampling means (MECH), and sliding correlation is performed on a final set of samples using a reference replica to remove noise (Cattaneo Publication, ¶¶ [0050]).

The Cattaneo Publication discloses a coherent integration that is performed to mitigate problems due to noise during a synchronization or channel estimation phase (Cattaneo Publication, ¶¶ [0022], [0068]). In Figure 13, reproduced below for convenience, the Cattaneo Publication shows N3 successive digital samples that are successively added,

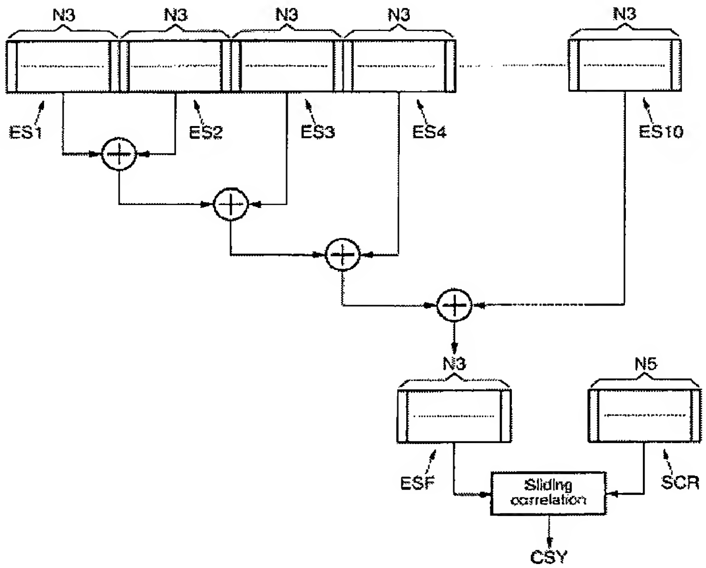


FIG.13

and with a final window, a sliding correlation is carried out with N5 reference samples. These time windows are successive in time, thus limiting their application to the synchronization or channel estimation phase, which is substantially different from time windows of the present invention. In particular, the Cattaneo Publication does not teach, or suggest, positioning of the time windows as a function of the known position of each pulse wherein the arrangement of pulses represents encoding of data according to claim 37, and wherein each window has a width smaller than the reverse of repetition frequency (PRF). Therefore, the Cattaneo Publication does not teach, or suggest, (i) "each of the N reception time windows is positioned in time as a function of a known theoretical arrangement of the N pulses of the signals transmitted by the transmitter device," and (ii)

> "the transmitter device includes
> i. a first oscillator stage delivering at least one first clock signal at a first defined frequency;
> ii. a first signal processing unit clocked by the clock signal provided by the first oscillator stage in order to modulate the data to be transmitted; and
> iii. a unit for shaping the N pulses of each sequence to be transmitted by the first wide band antenna of the transmitter device as a function of the data modulation provided by the first signal processing unit; and
> wherein the receiver device includes
> i. a second oscillator stage delivering at least one second clock signal at a second defined frequency;

ii. a second signal processing unit connected to the second oscillator stage; and

iii. an analogue-digital conversion stage for analogue signals relating to the coded data signals received by the second wide band antenna,"

as recited by claim 37.

v. **The Batra Patent**

The Batra Patent discloses an "ultra-wideband (UWB) receiver," which includes a system and method for maximizing a signal strength of a received signal pulse, wherein the system comprises a self-adjusting correlator/integrator (325) that uses no historical timing information (See Abstract of the Batra Patent, and Figure 3). The self-adjusting correlator/integrator according to the Batra Patent uses a plurality of simple correlators/integrators, such as correlator/integrator (805), which are configured to process a received signal at various times surrounding the signal pulse's expected arrival (See Abstract of the Batra Patent, and Figure 3). A comparator, such as comparator (820), selects an output of the simple correlators/integrators with greatest magnitude (See Abstract of the Batra Patent, and Figure 3).

In particular, the Batra Patent discloses the use of two correlators (905), (925), and the combination of their outputs as shown in Figure 9b by selecting the largest of the outputs (Batra Patent, col. 11, lines 49-64). The first correlator (905) is matched to a positive amplitude and the second correlator (925) is matched to a negative amplitude (Batra Patent, col. 11, lines 54-57). Consequently, as would be instantly appreciated by a person of ordinary skill in the art, the device disclosed by the Batra Patent is insensitive to pulse polarity and is, therefore, not equipped to reject pulses with non-expected polarity.

vi. The Takamura Publication

The Takamura Publication discloses a "radio communications system, transmitter, receiver, radio transmission method, radio reception method and computer program therefor," wherein the radio communications system can accurately discriminate a desired signal from interfering signals, even when signals from a plurality of transmitters are received simultaneously, wherein the transmitter for this system communicates information using signals which are repeated over predetermined periods (See Abstract of the Takamura Publication). According to the Takamura Publication, a pulse generator generates pulses having a predetermined repetition period based on an information bit to be communicated, and transmission means transmit the pulses generated by the pulse generator (See Abstract of the Takamura Publication). Furthermore, pulse amplitude alterating means control the amplitude of the pulses to be transmitted by the transmitting means in accordance with a predefined pattern under the control of a control unit (See Abstract of the Takamura Publication).

The Takamura Publication discloses a UWB pulse transmitter, which can use pulse amplitude modulation (Takamura Publication, ¶¶ [0006], [0014], [0036] and [0037]). The information for the pulse amplitudes is generated using the "pulse amplitude alterating means" (See Abstract of the Takamura Publication). However, the invention according to claim 32 of the above-captioned application tunes the clock signal frequency of the receiver device so that the amplitude level of a final addition window is maximized. The Takamura Publication does not teach, or suggest, the "pulse amplitude alterating section" is applied to the receiver device or to a clock signal frequency tuning device. Thus, the Takamura Publication is not relevant to the subject matter disclosed by the Cowie Publication.

vii. <u>Summary of the Disclosures</u>

The Cowie Publication, the Fette Publication, the Cattaneo Publication, the Batra Patent, and the Takamura Publication, taken either alone or in combination, fails to teach, or suggest, (i)

> "<u>carrying out, in the receiver device, an operation of adding the N windows in a coherent manner before data demodulation so that added pulse amplitude level is higher than noise amplitude level captured by the receiver device,</u>"

(ii) "<u>each of the N reception time windows is positioned in time as a function of a known theoretical arrangement of the N pulses of the signals transmitted by the transmitter device,</u>" and (iii)

> "the transmitter device includes
> i. a first oscillator stage delivering at least one first clock signal at a first defined frequency;
> ii. a first signal processing unit clocked by the clock signal provided by the first oscillator stage in order to modulate the data to be transmitted; and
> iii. a unit for shaping the N pulses of each sequence to be transmitted by the first wide band antenna of the transmitter device as a function of the data modulation provided by the first signal processing unit; and
> wherein the receiver device includes
> i. a second oscillator stage delivering at least one second clock signal at a second defined frequency;
> ii. a second signal processing unit connected to the second oscillator stage; and
> iii. an analogue-digital conversion stage for analogue signals relating to the coded data signals received by the second wide band antenna,"

as recited by claim 37.

For all of the above reasons, the combination of the Cowie Publication, the Cattaneo Publication, the Batra Patent, and the Takamura Publication cannot establish a <u>prima facie</u> case of obviousness against claim 37 of the above-captioned application.

viii. No Legitimate Reason to Combine the Disclosures as Proposed and No Reasonable Expectation of Success Even if the Combinations Were Made

A proper rejection under Section 103 requires showing (1) that a person of ordinary skill in the art would have had a legitimate reason to attempt to make the composition or device, or to carry out the claimed process, and (2) that the person of ordinary skill in the art would have had a reasonable expectation of success in doing so. PharmaStem Therapeutics, Inc. v. ViaCell, Inc., 491 F.3d 1342, 1360 (Fed. Cir. 2007). In this case, the object of the present invention is to provide a method via encoded ultra-wide band data signals, in particular, for maximizing the amplitude of the data pulses in relation to the noise picked up by the receiver device, and to provide the receiver device for implementing the method. In order to achieve this objective, the present invention adds N time windows, which include each one of N pulses per sequence. The N time windows are positioned in time as a function of a known theoretical arrangement of the N pulses of the picked-up signals. Thus, according to the position of the N time windows, the coherent addition of the windows allows maximizing of the amplitude of the resulting pulse(s) above the noise.

The Cowie Publication, the Fette Publication, the Cattaneo Publication, the Batra Patent, and the Takamura Publication fail to disclose the addition of N windows in the manner claimed. Therefore, a person of ordinary skill in the art would have no legitimate reason to combine the disclosures of this many documents, and the person of ordinary skill in the art would not have had a reasonable expectation of success of obtaining the Applicants' claimed invention even if the disclosures of the various documents asserted by the Examiner were combined.

For all of the above reasons, the Examiner cannot establish a prima facie case of obviousness against claim 37 of the above-captioned application.

III. CONCLUSION

Claim 36 has been allowed. Independent claim 18 as amended now corresponds in scope to previous claim 23, and is allowable for the reasons of record. Claims 19-22 and 24-35 all depend either directly or indirectly on claim 18 and are, therefore, likewise allowable for the reasons of record.

The Examiner has not established a prima facie case of obviousness against new independent claim 37 because the combination of the Cowie Publication, the Fette Publication, the Cattaneo Publication, the Batra Patent, and the Takamura Publication fails to teach, or suggest, each and every limitation recited in the claim, and arranged as in the claim.

For all of the above reasons, claims 18-22 and 24-37 are in condition for allowance, and a prompt notice of allowance is earnestly solicited.

Questions are welcomed by the below-signed attorney for Applicants.

Respectfully submitted,

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